4 POWDERS

4.1 INTRODUCTION

Fingerprint powders are very fine particles with an affinity for moisture throughout a wide range of viscosity. Palmar sweat, grease, oil, and most contaminants that coat the surface of friction ridge skin possess sufficient moisture and viscosity to attract and bind the fine particles together. Contact between friction ridge skin and a non-porous surface will sometimes result in a transfer of the skin coating to that surface. The non-absorbency of the surface prevents penetration by the deposited moisture. All fingerprint powders are indiscriminate in adhesion to moisture. Surfaces coated with residue in addition to suspected latent prints will attract powders all over the surface

Dependent upon the composition of the residue, the deposited moisture will range from a most apparent appearance to the barely perceptible or invisible, even under oblique lighting. Powder application is the effort to produce or improve the appearance for preservation.

The most effective agent in terms of adherence to moisture, non-adherence to dry surfaces, particle size, shape, uniformity, and intensity of color is carbon. Carbon is black, and as a result, black powders which contain carbon will consistently produce the best results. Most commercial black fingerprint powders have a high carbon base. According to the manufacturer's particular formula and production methods, the carbon base may be from a variety of sources, including lamp black, bone, or wood charcoal. Commercial powders contain milled carbon of highly uniform size and shape along with additional ingredients to preserve the milled condition and retard moisture absorption. Other colored powders may be required due to the substrate encountered, but should be restricted to absolute necessity.

Magnetic powders are powder-coated, fine iron filings subject to magnetic attraction. These adhere to moisture to a lesser degree than carbon powders, but can be applied with less destructive force to the surface.

Redwop fluorescent powders have a lycopodium base and were developed specifically to be luminescent - excited by light sources emitting blue-green light. Redwop fluorescent powder is recommended as a primary use fluorescent powder for examination of latent prints with forensic light sources and ultraviolet light sources.

4.2 PREPARATIONS

No specific preparations are needed as the powders and materials being used are commercially prepared.

4.3 INSTRUMENTATION

See Appendix III-General Instrumentation.

4.4 MINIMUM STANDARDS AND CONTROLS

The Standards and Controls for the Powders consist of insuring that the powders being used are in the proper condition. Powders should not be exposed to high humidity or moisture. Powders may clump if exposed to excessive moisture or contaminants. Moisture content and contaminants may be minimized by keeping the stock container closed as much as possible and using containers with small amounts of powder to work from. This will minimize the moisture content as well as reduce any contamination of the stock container with substances from the item being processed. Powders may also be kept in desiccators designed to reduce the moisture in the atmosphere in the enclosed desiccator unit.

4.5 PROCEDURE OR ANALYSIS

4.5.1 Standard Powders

Powders may be applied by various means, but the preferred procedure for most items is the use of a brush. Fiberglass brushes are the easiest to use and maintain while permitting application over a wider area. Powders are more effective if applied in very small amounts. While some examiners prefer pouring a supply of powder into a secondary container or a piece of paper, direct contact between brush and powder container is acceptable. Only the

ends of the brush bristles should be coated with the powder, and the brush should be gently tapped several times to remove all but a minimum amount.

With the brush handle in a nearly perpendicular position to the surface, the bristle ends are lightly and delicately moved over the surface. Discoloration of the latent print residue will usually appear immediately. With a fiberglass brush and a proper amount of powder, the impression will develop in density with each light pass until no further development can be observed. Even slightly excessive amounts of powder will cause a fill to occur between ridges. This fill must be removed with continued brush strokes until the impression is as free of extraneous powder as possible. Except on highly polished surfaces, excessive brushing is rare with a fiberglass brush. However, at the first indication that the impression is being removed, all further brushing must cease.

Extraneous residue on the surface may cause a general painting effect which obscures friction ridge detail. A lift made of the area can sometimes remove the extraneous material and permit a second application of powder. This second application may offer better contrast between latent print deposit and the background.

4.5.2 Magnetic Powders

Magnetic powder must be applied with a magnetic application device. Wands which contain a movable magnet attract the powder when the magnet is depressed and release the powder when it is raised. Contact between powder and surface is completed without bristles and is more light and delicate than the fiberglass brush. However, the particle size, larger than standard powder, has a tendency to paint some surfaces. Excessive powder can sometimes be removed by passing the magnetic wand without powder near the surface. Since the magnetic attraction holding the iron particles is relatively weak, the supply can be depleted quickly. Surface areas examined generally must be processed more slowly with magnetic powders, and great care must be exercised to prevent actual contact between the end of the wand and the surface.

4.5.3 Redwop Powder

Redwop powders are applied in the same manner as standard powders. It is not recommended to make a lift of the latent print but view with a light source. If lifting is desired, process with black powder and then lift.

4.6 INTERPRETATION OF RESULTS

Powder developed latent impressions must be properly preserved. Experiments have revealed that the developed latent impressions have a weaker adhesion to the surface than undeveloped, and, as a result, are more susceptible to damage from accidental contact. Two methods of preservation are normally afforded the powder developed latent: photography and lifting.

Photographic preservation of the developed impressions on the item affords the best procedure in terms of minimal damage and complete documentation. Lifting is also an approved procedure but caution should be taken when lifting to insure that the lift will be successful. If the lift can not be made with confidence that it will be successful, the developed fiction ridge detail should be photographed prior to lifting.

4.7 REFERENCES

- Cowger, James F. *Friction Ridge Skin Comparison and Identification of Fingerprints*; Boca Raton: CRC Press, 1993.
- Lee, Henry C.; Gaensslen, R. E., eds. *Advances in Fingerprint Technology*; Elsevier Science Publishers, NY, 1991.
- Olson, Robert. *Scott's Fingerprint Mechanics;* Charles C. Thomas Publisher: Springfield, IL, 1978.
- Waldoch, Terry L. "The Flame Method of Soot Deposition For The Development of Latent Prints On Non-porous Surfaces"; *Journal of Forensic Identification*, 1993, 43, 5, 463-465.

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